
Balsam-related systemic contact dermatitis

Tamara N. Salam, MD, and Joseph F. Fowler, Jr, MD *Louisville, Kentucky*

Background: Positive patch tests to balsam of Peru (BOP) or fragrance mix (FM) suggest the possibility of systemic contact dermatitis from balsam-related foods and spices.

Objective: This was a retrospective study to determine whether avoidance of balsam-related foods results in an improvement of dermatitis in these patients.

Methods: A review of the records of all patients seen from July 1 to Dec 31, 1998 with positive patch tests to BOP, FM, cinnamic aldehyde, and balsam of tolu was performed 9 to 14 months after their evaluation in a tertiary dermatology center. All patients were contacted via telephone to assess the status of their dermatitis and whether they were able to note any specific balsam-related food allergies.

Results: A total of 75 patients were identified, and 71 could be contacted. Fourteen were only allergic to BOP or FM on testing; 31 were positive to BOP/FM and other allergens with presumed relevance to BOP/FM; 26 were positive to BOP/FM and others with other allergens felt to be responsible for the dermatitis and were not placed on a BOP diet. Excluding this last group, 21 of 45 (47%) had complete or significant improvement that they related to dietary modification. Ten did not modify their diet, with 8 reporting no improvement. Eight improved with fragrance or other allergen avoidance only, and 6 modified their diet unsuccessfully. Most commonly implicated foods included tomatoes, citrus, and spices.

Conclusion: Almost half of the subjects with positive patch tests to BOP or FM who followed a BOP reduction diet reported significant to complete improvement of their dermatitis. (*J Am Acad Dermatol* 2001;45:377-81.)

Sensitivity to balsam of Peru (BOP) and fragrance mixture (FM) is commonly found on patch testing. After an initial description by Bonnevie¹ in the late 1930s to 1940s, Niels Hjorth,² in 1961, noted a relationship between allergy to BOP and allergy to various spices and flavorings such as cinnamon, vanilla, and cloves. Therefore, whereas BOP and FM are indicators of fragrance allergy on patch testing, positive reactions to these allergens may indicate the possibility of experiencing systemic contact dermatitis from balsam-related foods and spices. Since then, several authors have studied this in Europe, but until now, it has never been addressed in a major study in the United States.

MATERIAL AND METHODS

This is a retrospective study in which the records of all patients with suspected contact dermatitis

referred to a tertiary dermatology center for patch testing from July 1 to Dec 31, 1998 were examined. Patients were patch tested with the 50 North American Contact Dermatitis Group (NACDG) allergens and others as indicated. Allergens were supplied by Hermal USA (Oak Hill, NY) or Chemo-technique (Malmö, Sweden). All patients who had positive patch tests to BOP, FM, cinnamic aldehyde, balsam of tolu, or combinations of the above were selected. Patients with positive reactions to any of the above allergens were placed into 1 of 3 categories. Group A consisted of patients with allergy to one or more of the above allergens only. Group B patients had allergy to one or more of the above and other tested allergens and were advised to follow the BOP diet. These patients were selected for group B on the clinical judgment that the other allergens could not totally explain the presenting dermatitis. Group C was composed of patients whose dermatitis was believed to be caused by an allergen(s) other than balsam, based on clinical presentation and other positive patch test results. These patients were not placed on the BOP diet.

Demographic information, including the location of the dermatitis, was gathered. When seen in the office after patch testing, patients in groups A and B

From the Division of Dermatology, University of Louisville.

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Reprint requests: Joseph F. Fowler, Jr, MD, 444 S 1st St, Louisville, KY 40202.

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Table I. Balsam of Peru diet (foods to avoid)

- Products that contain citrus fruits (oranges, lemons, grapefruit, bitter oranges, tangerines, and mandarin oranges). For example, marmalade, juices, and bakery goods
- Flavoring agents such as those found in Danish pastries and other bakery goods, candy, and chewing gum
- Spices such as cinnamon, cloves, vanilla, curry, allspice, anise, and ginger
- Spicy condiments such as ketchup, chili sauce, barbecue sauce, chutney and the like, and liver paste
- Pickles and pickled vegetables
- Wine, beer, gin, and vermouth
- Perfumed or flavored tea and tobacco, such as mentholated tobacco products
- Chocolate
- Certain cough medicines and lozenges
- Ice cream
- Cola and other spiced soft drinks such as Dr Pepper
- Chili, pizza, Italian and Mexican foods with red sauces
- Tomatoes and tomato-containing products

Table II. Group A: Patients only patch-test positive to BOP, fragrance mix, cinnamic aldehyde, or Balsam of tolu

Group A (n = 14)	Clearing of dermatitis				% With complete or significant
	Complete	Significant	Mild	None	
Followed diet (n = 10)	6	4	0	0	100
Did not follow diet (n = 4)	1	0	0	3	25

were advised to follow the BOP diet. This involved eliminating all of the foods on the diet list (Table I) for 3 to 6 weeks and then reintroducing one food at a time every 1 to 2 days. The patient then notes whether a flare-up occurs, and if so, the patient is thought to have an allergy to that particular food.

All patients were contacted via telephone beginning in September 1999 to assess the status of their dermatitis. If applicable, they were asked whether or not they were able to follow the diet for at least 1 to 2 months. Their improvement was categorized into complete, significant, mild, or none. In addition, all food allergies suspected by the patient were noted, including other allergens, and whether or not fragrance avoidance was involved in their improvement. Patients who had mild or no improvement with fragrance or other allergen avoidance, and who had not followed the diet, were placed on the diet if agreeable. A follow-up phone call was then made 1 to 2 months later to assess the effect of dietary changes.

RESULTS

A total of 276 patients were patch tested between July 1 and Dec 31, 1998. Of these, 75 patients (27%) had positive patch tests to BOP, FM, cinnamic aldehyde, or balsam of tolu. There were 24 men (32%) and 51 women (68%), with a female/male ratio of 2:1. Ages ranged from 15 to 78 years, with a median age of 58 years and an average age of 53 years. Four

patients could not be reached; therefore a total of 71 patients were contacted via telephone. Four of 14 in group A did not follow the diet; of these 4, 3 reported no improvement and 1 reported that dermatitis cleared solely with topical steroids. The remaining 10 followed the diet, and all 10 had complete/significant improvement. Seven of the 10 cited that specific foods exacerbated their dermatitis, with 1 of the 7 reporting that fragrance avoidance also was involved in their improvement. Two of 10 cited that fragrance avoidance alone led to their improvement. One of 10 reported that the dermatitis cleared spontaneously (Table II).

Five of 31 in group B did not follow the recommended BOP diet and had mild or no improvement. One of 31 improved after treatment for another dermatosis (fungal infection). The remaining patients in group B were subdivided into groups B1 and B2, for the purposes of data analysis.

Group B1 consisted of the 16 of 31 patients reporting that the BOP diet had major involvement in their improvement and who had no other significant allergies. Group B2 consisted of the 9 of 31 patients who believed that the diet had only minor importance in their improvement. A total of 14 of the 16 patients in group B1 reported complete or significant improvement, and 2 of the 16 reported mild improvement. All 16 patients cited that specific foods exacerbated their dermatitis with 6 of the 16

Table III. Results of groups A and B

Improvement	Group A	Group B1	Group B2	Total (n =45)
Complete/significant with BOP diet	7	14	0	21 (47%)
Mild/none with BOP diet	0	2	4	6 (13%)
Complete/significant with fragrance or other allergen avoidance <i>only</i>	4	0	5	9 (20%)
Mild/none without BOP diet	3	5 (group B)		8 (18%)
Misdiagnosis				1 (1%)

Group A: See Table II.

Group B1: Patients positive to the listed allergens and other unrelated allergens in whom dietary avoidance resulted in significant clearing of dermatitis.

Group B2: Patients positive to the listed allergens and other unrelated allergens in whom dietary avoidance resulted in insignificant clearing of dermatitis.

Table IV. Food items most commonly mentioned by 30 patients as causes of flare-up of dermatitis (groups A and B1)

	No.	%
Tomatoes	10	33
Citrus	9	30
Spices	7	23
Cola/soda	5	17
Chocolate	3	10
Chili	3	10
Cinnamon	2	7
Beer/wine	2	7
Vinegar	2	7
Dairy products	2	7
Coffee	1	3
Baked goods	1	3
Peanuts	1	3

reporting that fragrance avoidance also was involved in their improvement. One of the 16 cited that other allergen avoidance also was involved. In group B2, 4 of 9 reported mild or no improvement on the BOP diet, whereas 5 of 9 cited complete or significant relief with fragrance or other allergen avoidance.

Group C consisted of 26 patients who were positive to balsam/fragrance allergen(s) but in whom the diet was not recommended because other allergens were believed to be clinically relevant.

Considering groups A and B, a total of 45 patients, 21 (47%) reported complete or significant improvement on the BOP diet and 6 (13%) cited mild or no improvement on the diet. Nine (20%) reported complete or significant improvement with avoidance of fragrance and other allergens alone, and 8 (18%) did not follow the diet and cited mild or no improvement (Table III).

Looking at group A and Group B1 (Table IV), a total of 30 patients, the most commonly reported food allergens were tomatoes (33%), citrus (30%), spices

Table V. Location of dermatitis (groups A and B, n = 45)

	No.	%
Hands	14	31
Face	14	31
Anogenital	14	31
Trunk	12	27
Lower extremities	11	24
Upper extremities	10	22
Scalp	6	13
Axilla	5	11
Feet	5	11
Intraoral	4	9

including vanilla (23%), cola/soda (17%), and chocolate (17%). The 3 most frequently reported sites of dermatitis in this series were the hands, face, and anogenital regions, all with the same frequency of 31% (Table V). Comparing these with the most recent NACDG data whose top 3 sites were hands (37%), face (21%), and arm (16%), the anogenital region may be a dermatitis location that is more prevalent in patients with balsam and fragrance allergies.³

ILLUSTRATIVE CASE REPORTS

A 52-year-old man presented with anogenital dermatitis. Positive patch tests to BOP, FM, and balsam of tolu were obtained. He was placed on the BOP diet, which he was able to follow for 1 to 2 months; he reported complete clearing of his dermatitis. He identified tomatoes (or any derivative) and spices as his offending allergens. This patient is a clear example of patients in group A.

A 50-year-old woman presented with contact dermatitis on her upper and lower extremities and back. Positive patch tests to BOP, balsam of tolu, and cocamidopropyl betaine were obtained. Based on presentation and lack of other significant allergens,

she was placed on the BOP diet, which she followed, and reported complete clearing. Her main food allergen was cola. Because she also had other positive allergens, she was placed in group B1.

A 52-year-old woman presented with anogenital and scalp dermatitis. Positive patch tests to BOP, FM, balsam of tolu, neomycin, thimerosal, nickel, MCI/MI, and bacitracin were obtained. She was placed on the BOP reduction diet and reported complete improvement with vinegar, citrus, and tomato product avoidance. She also noted that fragrance avoidance was involved in her improvement. Therefore she was placed in group B1 with a notation that fragrance avoidance was involved.

A 44-year-old man presented with hand dermatitis. His patch tests were positive to BOP, cinnamic aldehyde, N-isopropyl-N-phenyl, *para*-phenylenediamine, budesonide, and doxepin (Zonalon). He was placed in group C because it was thought that his dermatitis was caused by rubber derivatives; therefore he was not placed on the diet. He reported complete clearing with rubber avoidance.

DISCUSSION

Systemic contact dermatitis is a phenomenon in which parenteral or oral exposure to certain allergens can elicit a reaction very similar to allergic contact dermatitis. Typical allergens eliciting systemic contact dermatitis, or "hematogenous contact eczema," include metal salts (eg, nickel, mercury, cobalt, and chromium), substances of plant origin (eg, poison ivy, oleoresins, and BOP), and drugs.⁴

Since first observed in the 1940s by Bonnevie¹ and in 1961 by Hjorth,² several European researchers have paid particular attention to systemic contact dermatitis from balsam-related foods and spices. In 1983, Veien et al⁵ noted that 5 of 9 patients (55%) with chronic eczema and with a positive oral challenge to BOP had complete relief after being placed on a balsam-restricted diet.⁵ Again in 1985, Veien et al⁶ reported that 16 of 31 patients (52%) with positive BOP oral challenge had marked or complete improvement on the diet. Looking at patients with positive patch tests to BOP, in 1985 he noted that 15 of 24 (63%) had long-term improvement on the diet; again in 1996, he noted 9 of 14 (64%) had long-term benefit from the diet.^{7,8} These studies support the value of a balsam-restricted diet in those with a positive patch test to BOP, especially in the absence of other significant patch test findings. However, both Veien et al and Niinimäki^{9,10} have concluded that an oral balsam challenge is not effective at identifying patients who might respond to dietary balsam restriction. Therefore with lack of evidence that peroral challenge is a predictor of who will benefit from dietary restriction, this study

followed those with positive patch tests and simply looked at the clinical relevance of monitoring dietary changes.

Perhaps the strongest evidence for the importance of a trial of dietary balsam reduction in our study comes from the 14 patients we have designated as group A. These 14 had positive patch tests only to a balsam or fragrance allergen, and 10 followed a balsam-restricted diet. All 10 showed complete or significant improvement, whereas only 1 of 4 who did not follow the diet reported improvement. Of the 45 patients (groups A and B) in whom balsam dietary avoidance was recommended, 21 (47%) had complete or significant improvement primarily related to dietary modification. Nine of 45 (20%) did not follow the recommended diet, and only 1 had significant improvement. The overall results of groups A and B indicate that almost half of subjects with positive patch tests to BOP or FM who followed the diet reported complete or significant improvement of their dermatitis that they could directly attribute to the avoidance of specific foods. This high number of subjects who reported improvement with dietary avoidance is somewhat surprising. Because so little work has been done in this area outside of Scandinavia, it may be that we have overlooked cases of systemic allergic contact dermatitis. Further exploration of this topic in other centers is warranted, given the frequency of positive patch tests to balsam and fragrance allergens.

A possible limitation of this study, and indeed a problem in clinical practice, is the difficulty in pinpointing "balsam-related" foods, spices, and flavorings. BOP itself is a natural plant extract containing dozens of individual substances.¹¹ Many of these substances are also found in the food items listed in Table I. However, the diet we used was modified from the one offered by Veien et al.⁷ The major addition is tomato, which was the most frequently mentioned food by our patients. We cannot confirm which individual substances in tomatoes are cross-reactions with BOP. However, for the purposes of good patient care, we tried to make our BOP diet as comprehensive as possible. We would rather include a food or spice that might not cause allergy than exclude one that does. Therefore we prohibited all ice creams, candies, spices, and flavorings for at least 1 month, even if we cannot document that some of these items may cross-react with BOP.

It can be argued that a study of this nature may be unreliable because it relies on subjective patient opinion. Unfortunately, there is no objective scientific measure to quantify dietary balsam exposure. We believe, however, that the concept of this study is valid because it measures actual clinical improve-

ment, which patients themselves can determine in a controlled fashion.

Further investigation of balsam-related foods is needed. The information we already have, however, is enough to be of help to many of our patients with allergic contact dermatitis, especially those without external (cutaneous) sources of allergen exposure.

Initially after patch testing, the clinician needs to identify any other significant allergens in a patient with positive patch test(s) to BOP or FM. If avoidance of other significant allergens or fragrances is unsuccessful, then a balsam restriction diet may be useful as the next treatment modality. Patients who are solely allergic to BOP, FM, cinnamic aldehyde, or balsam of tolu should, in addition to fragrance avoidance, be placed on the diet. Severe diet restrictions are difficult for most patients to adhere to, but with education regarding the benefit of pinpointing 1 to 3 offending foods, most patients are responsive and compliant. In this manner, patients are able to define which foods to avoid and are able to enjoy foods to which they are not sensitive.

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AMERICAN BOARD OF DERMATOLOGY EXAMINATION DATES

In 2001, the Certifying Examination of the American Board of Dermatology (ABD) will be held at the Holiday Inn O'Hare International in Rosemont, Illinois on Oct 14 and 15, 2001.

The next examination for subspecialty certification in Dermatopathology will be held in Tampa, Florida on Friday, Nov 16, 2001.

The next examination for subspecialty certification in Clinical and Laboratory Dermatological Immunology will be held in Rosemont, Illinois, on Oct 12, 2001.

The next Recertification Examination of the ABD will be mailed to approved candidates on June 1, 2001.

A certification process is being developed for the subspecialty of Pediatric Dermatology. It is anticipated that the first examination will be administered in 2002 or 2003. Further details about the examination will be available from the Board office.

For further information about these examinations, please contact:

Antoinette F. Hood, MD

Executive Director, American Board of Dermatology

Henry Ford Hospital

1 Ford Place

Detroit, MI 48202-3450

Telephone: (313)874-1088

Fax: (313)872-3221